

# Engineering Cyanobacteria for the Production of Lightweight Materials

Completed Technology Project (2015 - 2018)



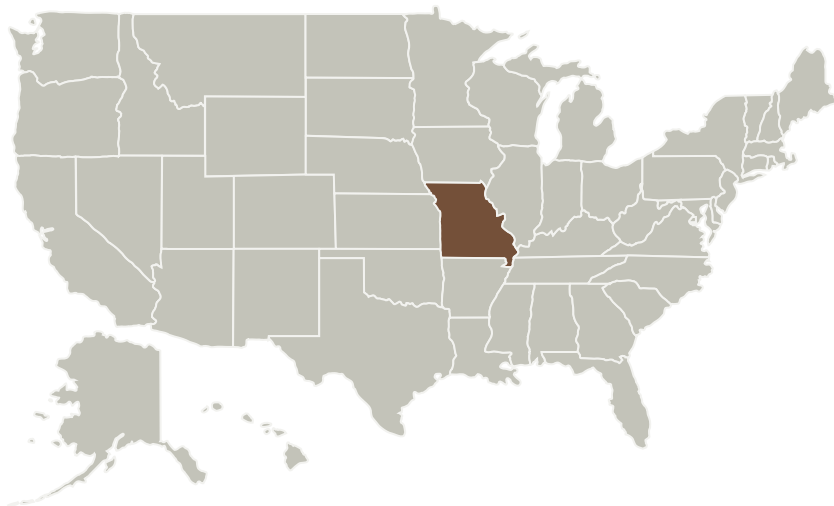
## Project Introduction

Future space exploration will demand the development of highly efficient technologies to recycle readily available resources (e.g. in situ resource utilization, ISRU) for the sustainable production of indispensable supplies. Recent development in synthetic biology has enabled controllable cellular behavior and novel metabolic functionalities, leading engineered cells to perform naturally-unachievable tasks. Using synthetic biology methodologies, this project aims to develop a cyanobacterial platform that converts CO<sub>2</sub> to lightweight, high-performance materials for critical applications in future NASA space exploration missions (e.g. shuttle repairs, ropes, parachutes, insulation, clothing, seals, packing material, etc.). The ability to generate these materials by ISRU would reduce the need for resupply missions and decrease launch weights, increasing the feasibility of long-distance missions and extraterrestrial colonization.

## Anticipated Benefits

The ability to generate lightweight high-performance materials by ISRU would reduce the need for resupply missions and decrease launch weights, increasing the feasibility of long-distance missions and extraterrestrial colonization.

## Primary U.S. Work Locations and Key Partners



Engineering Cyanobacteria for the Production of Lightweight Materials

## Table of Contents

Project Introduction	1
Anticipated Benefits	1
Primary U.S. Work Locations and Key Partners	1
Project Website:	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3
Target Destinations	3

# Engineering Cyanobacteria for the Production of Lightweight Materials

Completed Technology Project (2015 - 2018)



Organizations Performing Work	Role	Type	Location
Washington University in St Louis	Lead Organization	Academia	Saint Louis, Missouri

Primary U.S. Work Locations
Missouri

**Project Website:**<https://www.nasa.gov/directorates/spacetech/home/index.html>

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Washington University in St Louis

**Responsible Program:**

Space Technology Research Grants

## Project Management

**Program Director:**

Claudia M Meyer

**Program Manager:**

Hung D Nguyen

**Principal Investigator:**

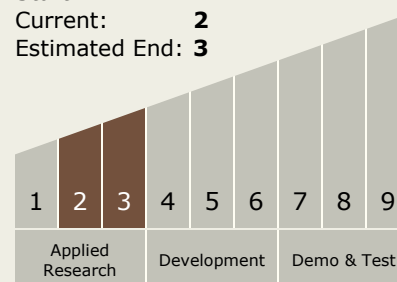
Fuzhong Zhang

## Technology Maturity (TRL)

Start: 2

Current: 2

Estimated End: 3



# Engineering Cyanobacteria for the Production of Lightweight Materials

Completed Technology Project (2015 - 2018)



## Technology Areas

### Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - └ TX12.3 Mechanical Systems
    - └ TX12.3.8 Docking and Berthing Mechanisms and Fixtures

## Target Destinations

Earth, The Moon, Mars